Contacts

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Faculty of Engineering
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Fax: (65) 6777 1434

Location
Block E1A, Level 6
National University of Singapore

Website: http://www.eng.nus.edu.sg/ise
### Academic Calendar Sem 2, 2009/10

<table>
<thead>
<tr>
<th>Semester 2</th>
<th>Mon 11 Jan - Sat 8 May 2010</th>
<th>17 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructional Period:</td>
<td>Mon 11 Jan – Fri 12 Feb 2010</td>
<td>5 weeks</td>
</tr>
<tr>
<td>Mid-semester Break</td>
<td>Sat 13 Feb – Sun 21 Feb 2010</td>
<td>1 week</td>
</tr>
<tr>
<td>Instructional Period:</td>
<td>Mon 22 Feb – Fri 16 Apr 2010</td>
<td>8 weeks</td>
</tr>
<tr>
<td>Reading Week:</td>
<td>Sat 17 Apr - Fri 23 Apr 2010</td>
<td>1 week</td>
</tr>
<tr>
<td>Examination:</td>
<td>Sat 25 Apr - Sat 8 May 2010</td>
<td>2 weeks</td>
</tr>
<tr>
<td>Vacation:</td>
<td>Sun 9 May - Sun 1 Aug 2010</td>
<td>12 weeks</td>
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### Academic Calendar Sem 1, 2010/11

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>Mon 2 Aug - Sat 4 Dec 2010</th>
<th>18 weeks</th>
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<tbody>
<tr>
<td>Orientation Week:</td>
<td>Mon 2 Aug - Sat 7 Aug 2010</td>
<td>1 week</td>
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<tr>
<td>Instructional Period:</td>
<td>Mon 9 Aug – Fri 17 Sep 2010</td>
<td>6 weeks</td>
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<tr>
<td>Mid-semester Break</td>
<td>Sat 18 Sep – Sun 26 Sep 2010</td>
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<tr>
<td>Instructional Period:</td>
<td>Mon 27 Sep – Fri 12 Nov 2010</td>
<td>7 weeks</td>
</tr>
<tr>
<td>Reading Week:</td>
<td>Sat 13 Nov - Fri 19 Nov 2010</td>
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</tr>
<tr>
<td>Examination:</td>
<td>Sat 20 Nov - Sat 4 Dec 2010</td>
<td>2 weeks</td>
</tr>
<tr>
<td>Vacation:</td>
<td>Sun 5 Dec 2010 - Sun 9 Jan 2011</td>
<td>5 weeks</td>
</tr>
</tbody>
</table>

### Important Links

<table>
<thead>
<tr>
<th>Department of Industrial &amp; Systems Engineering</th>
<th><a href="http://www.eng.nus.edu.sg/ise">www.eng.nus.edu.sg/ise</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>M.Sc. (ISE) Students Website</td>
<td><a href="http://www.ise.nus.edu.sg/msc_students/">www.ise.nus.edu.sg/msc_students/</a></td>
</tr>
<tr>
<td>Graduate Studies Office, Faculty of Engineering</td>
<td><a href="http://www.gse.nus.edu.sg">www.gse.nus.edu.sg</a></td>
</tr>
<tr>
<td>Office of Student Affairs</td>
<td><a href="http://www.nus.edu.sg/osa/">www.nus.edu.sg/osa/</a></td>
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An Introduction

Industrial and Systems Engineering is a discipline built upon a collection of methodological tools brought together to effect an integrated or "total" approach to problem-solving in engineering and management, with productivity improvement as its overall objective.

The original application of Industrial Engineering at the turn of last century was in manufacturing where the main objective was achieving maximum productivity through the design, improvement and installation of integrated systems of humans, machines and equipment. Such a technology-based orientation gradually changed with the development of operations research, cybernetics, modern control theory and computing power.

Today, the fields of applications have widened dramatically, ranging from the traditional areas of production engineering, facilities planning and material handling, to the design and optimization of more broadly-defined systems.

Industrial and Systems Engineering is unique among the engineering disciplines in that the application of its techniques is not restricted to technological or industrial problems, although these are the main areas of interest. Furthermore, it is primarily concerned with translating designs into economical products and effective services, rather than with the fundamental mechanics Systems Engineering is defined by the methodological tools used of design. Unlike other engineering disciplines, Industrial and Systems Engineering is defined by the methodological tools used rather than the areas of application. Thus industrial and systems engineers work under a wide variety of job titles.

Industrial and Systems Engineering provides the theoretical and intellectual framework to be focused on whatever area of interest, and incorporates inputs from a variety of disciplines, while maintaining the engineer's familiarity and grasp of physical processes.

Framework of Research in the Department
The Department

The Department of Industrial and Systems Engineering is one of the departments/divisions in the Faculty of Engineering. It conducts a Bachelor of Engineering (Industrial and Systems Engineering) undergraduate program and a Master of Science (Industrial and Systems Engineering) program. It also conducts jointly with the Department of Civil Engineering, a Master of Science (Transportation Systems and Management) Program. Students are also admitted for research-based degrees of Master of Engineering (M.Eng.) and Doctor of Philosophy (Ph.D.). These degrees are awarded on the basis of coursework and supervised research.

Master of Science (Ind. & Sys. Eng) Programme

The Master of Science (M.Sc.) programme is aimed at working professionals and catered to university graduates who wish to advance their knowledge and careers in their chosen field of specialisation. The M.Sc. (Ind. & Sys. Eng.) programme is designed to provide graduate level education to prepare individuals for a lifelong career addressing critical engineering and managerial decision making, in the manufacturing and service sectors. It is offered on both part-time and full-time basis and lessons are conducted in the evenings. The M.Sc. degrees are awarded once the candidates pass the relevant examinations and achieve a minimum level of proficiency in the examinations.

The programme also offers optional specialisations in Logistics & Operations Research and Project Management.

Logistics & Operations Research
This specialisation aims to equip the students with the requisite quantitative tools and management skills essential to the effective solution of logistics and supply chain problems in relevance to industry needs.

Project Management
This specialisation aims to equip the students with the requisite skills in managing engineering projects with emphasis on the management of R&D and product development. The students will be exposed to quantitative tools and behavioural techniques at the cutting edge of practice.

Prizes & Awards

The Standard Chartered Bank Prize
Awarded annually to the top graduating M.Sc.(ISE) students w.e.f. 2002.

The National Semiconductor Mfr S’pore Pte Ltd Gold Medal
Awarded to the graduating student who authors the best research paper in an international journal.

The Motorola Electronics Pte Ltd Prize
Awarded annually to the graduating top student in M.Sc.(ISE) with specialization in Quality Engineering.

The Operational Research Society of Singapore (ORSS) Prize
Awarded annually to the graduating top student in M.Sc.(ISE) with Specialization in Operations Research.

The Institute of Industrial Engineers, Singapore
Awarded annually to the graduating top student in the ISE foundation modules.

The Singapore Quality Institute (SQI) Prize
Awarded annually to the top student in IE5122 Statistical Quality Control.
ADJUNCT PROFESSOR

LUI Pao Chuen
MSc NPS(USA), BSc SU

- Systems engineering
- Cost benefit analysis
- Life cycle management
- Project management
- Systems dynamics

ADJUNCT ASSOCIATE PROFESSORS

Naresh KUMAR
PhD Loughborough, MSE Michigan, BSc Western Ontario

- Systems ergonomics
- Environmental ergonomics
- Cognition
- Work physiology
- Product design

ADJUNCT ASSISTANT PROFESSOR

LAI Kah Wah
MSc, BEng NUS
PG Dip. Cranfield (UK)

- Critical infrastructures assessment and protection
- System dynamics modelling
- Military operations analysis

YAM Hong See
MSc, BEng NUS

- Process Capability Analysis
- Measurement System Analysis
- Statistical Process Control
- Design of Experiments
- Regression Analysis
- Monte Carlo Simulation
- Multivariate Statistical Analysis

Admission Details

Master of Science (Industrial and Systems Engineering)

The Master of Science (Industrial and Systems Engineering) program is designed to provide graduate level education for working engineers in both manufacturing and service sectors. It is conducted on both part-time and full-time basis.

Application for Admission

Applications for admission to the program are invited twice a year through announcements in the press prior to the commencement of the program in either August or January of the following year.

Admission Requirements

Applicants must have at least a bachelor’s degree with honors in Engineering or its equivalent. Candidates applying for the part-time program should preferably have had a period of relevant practical experience after obtaining their first degrees.

Period of Candidature

A candidate is required to pass ten graduate level modules with satisfactory Cumulative Average Point (CAP). The maximum candidature period is four years for a part-time program and two years for a full-time program, inclusive of approved medical leave and leave of absence. Candidates normally attend lectures on two evenings per week for a part-time program and four evenings per week for a full-time program.

Leave of Absence

A candidate may be granted medical leave at any time provided an application for such leave is supported by a certificate signed by a registered medical practitioner. Application for leave of absence other than medical leave should be submitted at least two weeks in advance prior to the proposed leave period. Applications for leave of absence should be made by completing Form PSE 3/97 (a copy may be obtained from Graduate Studies Office) and should be accompanied by supporting documents. Candidates taking leave of absence of more than three weeks (or more than four weeks for those on Reserve Service) during any given semester are normally required to take leave of absence for the whole semester. Periods of leave of absence are considered as part of the period of candidature.

Leave of absence will normally not be granted to candidates who have already signed up for their examinations. Candidates who are absent from any examinations without good reasons will be deemed to have sat and failed the examinations.
Coursework Requirements

For continuation of candidature, a student must demonstrate satisfactory progress during his/her candidature:

(i) **Academic warnings and Probation:**
- subject to subparagraph (ii), warnings are issued to students if Cumulative Average Point (CAP) is < 3.0 (B-)

(ii) **Dismissal** and refuse re-admission to students if:
- in the 1st semester of study, the Cumulative Average Point (CAP) is <1.5 (D+)
- for 2 consecutive semesters of study, the Cumulative Average Point (CAP) is < 2.5 (C+)
- for 3 consecutive semesters of study, the Cumulative Average Point (CAP) is < 3.0 (B-)

For graduation of candidature, a student:
(i) must complete and pass at least 10 modules or its equivalent of 40 modular credits (inclusive of foundation/core modules, if required)
(ii) must obtain a minimum Cumulative Average Point (CAP) of 3.00 (B-) for the best 10 modules taken;
(iii) must not have taken more than 15 modules/attempts of the modules or its equivalent of 60 modular credits during his/her M.Sc. candidature;

Students may be allowed to take more than 40 modular credits of coursework only if at the point of request to read more modules, the student has less than 40 modular credits or his/her Cumulative Average Point (CAP) is < 3.0 (B-). All graduate students are not permitted to repeat a module which he/she has passed for the purpose of improving his/her grade. In general, all students are expected to graduate after obtaining 40 modular credits and who have already achieved a Cumulative Average Point (CAP) of = 3.0 (B-).
Curriculum

The following graduate modules are currently being offered for the Master of Science (Industrial and Systems Engineering) program; not all modules are necessarily available in any one year. Up to two modules offered by other departments may be taken subject to approval.

(A) Foundation Modules
- IE 5001 Operations Planning and Control I
- IE 5002 Applied Engineering Statistics
- IE 5003 Cost Analysis and Engineering Economy
- IE 5004 Engineering Probability and Simulation

(B) Systems Engineering and methodologies
- IE 5006 Learning From Data
- IE 5107 Material Flow Systems
- IE 5108 Facility Layout and Location
- IE 5201 Service Operations Analysis & Design
- IE 5202 ... IE 5203 Decision Analysis
- IE 5401 Industrial Logistics
- IE 5402 Introduction to Systems Engineering and Architecture
- IE 5403 Systems Engineering Case Studies
- IE 5404 Large Scale Systems Engineering
- IE 5405 Inventory Systems
- IE 5409 Topics in Systems Engineering
- IE 5504 Systems Modeling and Advanced Simulation
- IE 5506 Computer-Based Decision Systems
- IE 5508 Applied Systems Optimization

Curriculum
Master of Science ~ Industrial & Systems Engineering

(C) Quality and Reliability Engineering
IE 5121 Quality Planning and Management
IE 5122 Statistical Quality Control
IE 5123 Reliability Engineering
IE 5124 Quality and Reliability by Design
IE 5125 Software Quality Engineering
IE 5129 Topics in Quality and Reliability Engineering

(D) Engineering Management
IE 5208 Systems Approach to Project Management
IE 5211 New Product Management
IE 5212 Management of Technological Innovation
IE 5213 Service Innovation and Management
IE 5214 Infocomm Systems Project Management
IE 5217 Fundamentals of Lean Six Sigma
IE 5291 Topics in Engineering Management

(E) Human Engineering
IE 5301 Human Factors in Engineering and Design
IE 5302 Ergonomics and Workplace Design
IE 5307 Topics in Human Factors Engineering

ASSOCIATE PROFESSORS

CHEW Ek Peng
PhD MS Georgia IT, MEng BEng NUS
e-mail: isecep@nus.edu.sg
- Logistics and inventory management
- Systems modeling and simulation
- Analysis of order picking systems
- Optimization

HUANG Huei Chuen
PhD MPhil MA MS Yale, BS Taiwan
e-mail: isehhc@nus.edu.sg
- Combinatorial optimization
- Logistics

YAACOB Ibrahim
PhD Stanford, MSc BEng NUS
(eon leave)
- Techniques for robust design
- Systems reliability and safety analysis
- Congestion management studies

LEE Loo Hay
PhD SM Harvard, BS Nat'l Taiwan
e-mail: isleelh@nus.edu.sg
- Discrete event dynamic systems
- Stochastic optimization
- Ordinal optimization
- Systems modeling and simulation
- Decision and control

POH Kim Leng
PhD MS Stanford, MEng BEng NUS
e-mail: isepohkl@nus.edu.sg
- Decision Analysis
- Intelligent decision systems,
- Systems optimization and meta-
- heuristics

TAN Kay Chuan
PhD VPI, MS BS Mass.
e-mail: isetankc@nus.edu.sg
- Human-machine systems design
testing and evaluation
- Human-computer interaction
- Quality management especially of
- IT-based systems
- Advances in QFD and other quality
- measurement tools
Faculty Members

Faculty members of the Department and their specialized teaching and research areas are listed below.

HEAD OF DEPARTMENT
TANG Loon Ching
PhD MS Cornell
MEng BEng NUS
e-mail: isetlc@nus.edu.sg

- Applied probability and statistics
- Quality and reliability engineering; Six Sigma
- OR techniques for operational control and revenue management
- Queueing and its applications

PROFESSORS
ANG Beng Wah
PhD Camb., BSc Nan.
e-mail: iseangbw@nus.edu.sg

- Energy economics and policy
- Energy and climate change
- Energy efficiency potential study
- Development of energy and sustainability indicators
- Systems analysis and modeling

GOH Thong Ngee
PhD Wis., BE Sask.
e-mail: isegohtn@nus.edu.sg

- Experimental design for product an process optimization
- Quality engineering: Taguchi methods; Robust design
- Statistical methodologies for quality and productivity in manufacturing
- Systems modeling and forecasting
- Six sigma methodologies

XIE Min
PhD Lic Linkoping
MSc Stockholm
e-mail: isexiem@nus.edu.sg

- Quality and reliability engineering
- Engineering statistics and data analysis
- Statistical process control
- Software quality and reliability

(F) Advanced Modules* (for research students)
IE 6001 Mathematical Programming for Engineering
IE 6002 Advanced Engineering Statistics
IE 6004 Advanced Engineering Probability
IE 6005 Stochastic Models and Optimization
IE 6099 ISE Research Methodology
IE 6126 Advanced Industrial Data Modelling and Analysis
IE 6127 Six Sigma Methodologies

* Offered to graduate research students only; may be taken by M.Sc. students only with special permissions.

Module Descriptions
For descriptions of the modules offered, please visit the ISE Website @
http://www.ise.nus.edu.sg/graduate_modules/index.html

Cross-faculty Modules
Students may read modules offered by another engineering department or other faculties within the University. Your request will be considered on a case-by-case basis by the module’s host department. The module will be counted towards your CAP and included as part of the degree requirement for graduation.
### Areas of Specialization

A candidate needs to complete at least 10 modules with at least 5 modules from the list of modules for the respective Areas of Specialization. The remaining modules can be taken from the list of another specialization or from the general list of modules. Not all modules will be offered in one academic year.

The specializations available are:
- Logistics and Operations Research
- Project Management

#### Specialization in Logistics & Operations Research

<table>
<thead>
<tr>
<th>5 Compulsory Modules</th>
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<tbody>
<tr>
<td>IE 5001 Operations Planning and Control I</td>
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<tr>
<td>IE 5002 Applied Engineering Statistics</td>
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<td>IE 5003 Cost Analysis and Engineering Economy</td>
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<td>IE 5004 Engineering Probability and Simulation</td>
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<tr>
<td>IE 5401 Industrial Logistics</td>
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<table>
<thead>
<tr>
<th>Elective modules for Specialization</th>
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<tbody>
<tr>
<td>At least 4 modules</td>
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<tr>
<td>IE 5107 Material Flow Systems</td>
</tr>
<tr>
<td>IE 5108 Facility Layout and Location</td>
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<tr>
<td>IE 5123 Reliability Engineering</td>
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<tr>
<td>IE 5203 Decision Analysis</td>
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<tr>
<td>IE 5405 Inventory Systems</td>
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<tr>
<td>IE 5409 Topics in Systems Engineering</td>
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<tr>
<td>IE5504 Systems Modeling and Advanced Simulation</td>
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<td>IE 5506 Computer-Based Decision Systems</td>
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</table>

Other elective modules may be chosen from within or outside the Department. Modules taken outside the Department are subject to the general guidelines and Department’s approval.

#### Specialization in Project Management

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<tr>
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